

**Organization:** Carnegie Mellon University

**Title:** Synthesis of Biofluidic Microsystems (SYNBIOSYS)

**Start Date:** September 2001

**End Date:** September 2004

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## Project Goals

The goal of this project is the development of a synthesis methodology for the design of microfluidic bioanalytical systems. The project will develop capabilities for the fully automatic design of bioanalytical separation subsystems from bioassay design specifications, fabrication process and biochemical buffer and species parameters. This capability will shorten the biofluidic microsystem development cycle, enabling the design of more complex biofluidic microsystems.

## Technical Approach

- Mathematical model of design constraints & objectives
- Sizing of lab-on-a-chip separation subsystems
- Optimization of subsystems, not devices
- Analytical equation based synthesis
- Flowsheet based synthesis
- Geometric modeling for place and route of an array of separation subsystems
- Physical modeling to support the design methodology

## Major Challenges

- Joule Heating Model, parameterized by channel aspect ratio
- Model for dispersion in straight channels between turns in a serpentine
- Parameterized electric field model in transition between straight channels and U-turns

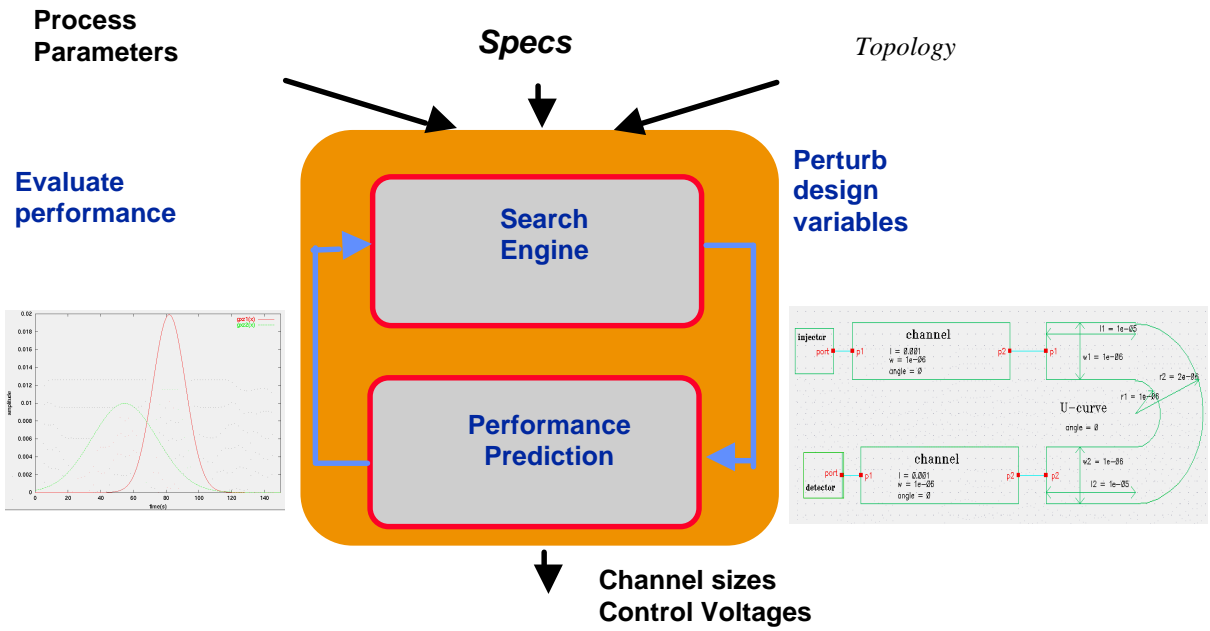
## Six -Month Milestones

- Develop accurate models for Joule Heating, wall effects and turn transition regions to enable analytic equation and flowsheet based synthesis
- Integrate models with synthesis algorithms to synthesize serpentine subsystem designs for various bioassay design specifications

## Team Member Organizations

Coventor Inc.

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### Automatic Synthesis of Lab-on-a-Chip Designs